REMARKS

Reconsideration of the Final Office Action of April 06, 2007 is respectfully requested.

To summarize the claim changes made in this Amendment, claims 4, 8, 12 and 33 have been canceled, while all other claims remain as presented in the last Amendment.

No new matter is considered to be introduced by these amendments.

Claim Rejections - 35 U.S.C. §112

Claims 1-12, 26, 29, 31-33 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The Examiner recites that in claim 1, the limitation, "computes the final clutch torque by a computation involving the first clutch torque and the second clutch torque in association with a ration coefficient value which ration coefficient value changes according the diameter difference of the tire so as to suppress a wheel slippage" is new matter.

Applicants respectfully submit that the limitation in claim 1 as above is supported on page 49, line 2 to page 50 line 3, page 50 lines 15-20 and page 51, lines 14-20. In these parts, the clutch torque T lsd, T lsdfb and T lsdff corresponds to a final clutch torque, a first clutch torque and a second clutch torque respectively. Also, the tire diameter difference constant Rtr is disclosed as an example of the ratio coefficient which changes according to the diameter difference of the tire (see page 47 lines 3-19 and Fig. 7), and there is described that slippage can be suppressed effectively.

Thus, this limitation in claim 1 is described in the specification in such a way to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 complies with the written description requirement under 35 U.S.C. 112, first paragraph.

The Examiner also recites that in claim 33, the limitation, "first end second torques are summed and said first and second torques are each associated with a weighted average ration coefficient" is new matter. This issue need not be addressed in the present case in view of claim 33 having been canceled in this Amendment.

Also, claims 1 and 4 (and their dependents) were rejected in the Office Action, with claim 1 asserted to be indefinite on the basis of whether "clutch unit" is referencing the "first or second clutch unit". However, while there is referenced "first torque" and "second torque" in claim 1, there is not indicated in claim 1 "first clutch unit" and "second clutch unit". Thus, it is respectfully

submitted that the rejection raised against claim 1 under 35 U.S.C. 112, second paragraph is raised in error. Also, the issue of whether claim 4 is or is not indefinite need not be addressed as claim 4 has been cancelled.

Claim Rejection - 35 U.S.C. §103

Claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over Rodrigues et al (US 6,047,231) in view of Ozaki et al (US 2002/0005077).

Applicants respectfully submit that Rodrigues in view of Ozaki fails to disclose or suggest the features of the present invention.

Examiner's Prior Art Rejection

Regarding claim 1, the Examiner recites:

Rodrigues discloses a differential limiting control apparatus for a vehicle having a clutch unit 135 interposed between one rotational shaft 132 and another shaft 133 (fig.1) for variably changing a driving force transmission between the one rotational shaft and the other rotational shaft, comprising:

a1) a target differential speed setting unit for setting a target differential speed between the rotational shaft and the other rotational shaft (col. 3, lines 22-67);

a2) an actual differential speed detecting unit for detecting an actual differential speed between the one rotational shaft and the other rotational shaft (col. 3, lines 23-67; col. 4, lines 29-67)

a3) a tire diameter difference computing unit for computing diameter difference of a tire (col. 9, lines 1-21); and

a4) a throttle opening amount detecting unit for detecting a throttle opening (col. 5, lines 20-29)

The Examiner acknowledges in the Office Action that Rodrigues fails to disclose " a first control unit for computing the clutch torque", "a second control unit for computing a second clutch torque", and "a final torque computing unit for computing a final clutch torque". In an effort to remedy these deficiencies reliance is placed on Ozaki. Namely, Ozaki is said to disclose:

a5) a first control unit for computing a first clutch torque of the clutch unit based on a deviation between a target differential speed and an actual differential speed (sections abstract, 0021, 0025, 0031, 0054, 0057, 0063-0080; figs, 1-4, 8-13);

a6) a second unit for computing a second clutch torque of the [[first]] clutch unit based on a throttle opening amount (sections abstract, 0021, 0025, 0031, 0054, 0057, 0063-0080; figs, 1-4, 8-13); and

a7) a final clutch torque computing unit for computing a final clutch torque, wherein the final clutch torque computing unit computes the final clutch torque by a computation involving the first and the second clutch torque in association with a ratio coefficient value which ration coefficient value changes according the diameter difference of the tire so as to suppress a wheel slippage (sections abstract, 0021, 0025, 0031, 0054, 0057, 0063-0080; figs, 1-4, 8-13).

This obviousness assertion is respectfully traversed for the reasons set out below.

Rodrigues et al.

Rodrigues discloses a transfer case 130 having an electrically controlled clutch 135 for transferring motive power from an engine to a front drive shaft 132 and the rear drive shaft 133.

In a preferred embodiment, when a spare tire (or a smaller diameter tire) is detected, the controller modifies the clutch operating parameter as follows. See column 7, line 56 – column 8, line 16.

> *In a preferred embodiment, upon sensing a spare tire, the clutch operating parameters are modified as illustrated in the Spare Tire Auto Mode Operation State 3, which are summarized as follows:*
>
> *Rear_Slip_Table_Values=Normal+1.5 KPH*
> *Clutch_Increment_Rate=4 inc*
> *ZZ_Thresh2_Limit=0.42*
>
> *Thus, in a preferred embodiment as illustrated above, the values for the rear slip are increased by 1.5 KPH, the clutch increment rate is increased and the threshold at which the autolock is commanded is lowered from approximately 60% to approximately 42% of clutch duty cycle. Furthermore, in the state 7 before the routing to sense a spare tire is run, the initial*

values of the rear slip table are increased by a Spare_Tire_Sense_Slip_Offset of 0.5 KPH.

As shown above, Rodrigues sets the clutch operating parameter in a single uniform way (Rear_Slip_Table_Values = Normal + 1.5 KPH, Clutch_Increment_Rate = 4 inc, ZZ_Thresh2_Limit = 0.42) regardless of variation of the actual effective diameter of the spare tire (or the smaller tire) on sensing a spare tire. Thus, both a slightly smaller tire and a drastically smaller tire are handled in the same manner, mentioned above, once the situation is recognized. There is no disclosure or suggestion about " a7) a final clutch torque computing unit for computing a final clutch torque, wherein the final clutch torque computing unit computes the final clutch torque by a computation involving the first and the second clutch torque in association with a ratio coefficient value which ration coefficient value changes according to the diameter difference of the tire so as to suppress a wheel slippage".

Moreover, there is no disclosure or suggestion about "a3) a tire diameter difference computing unit for computing diameter difference of a tire". As described above, Rodrigues doesn't need to compute the diameter difference of the tire, because the clutch operating parameters are modified in a single uniform way regardless of variation of the actual effective diameter of the spare tire or the smaller tire on sensing a spare tire. Thus, Rodrigues doesn't have to compute the diameter difference of the tire in its determination of whether a spare tire is present.

The Office Action includes an indication that "a3) a tire diameter difference computing unit for computing diameter difference of a tire" is disclosed in Rodrigues's col. 9, lines 1-21, but Applicants respectfully disagree.

In this section, Rogrigues explains two factors that can cause the effective wheel diameter of the two wheel and tire combinations to differ. One is a difference of the diameter of the tire (which may occur if tires are inflated to different air pressure or if the tire exhibit different flexing characteristics), the other is a difference of the diameter of the wheel (which may occur if mini spare tire is used). There is no disclosure or suggestion about "a3) a tire diameter difference computing unit for computing diameter difference of a tire" in this section.

Moreover, Rodrigues shows a spare tire sensing mode 240 wherein the controller 100 determines whether a spare tire is present in col. 4, line 48 through col. 5, line 19 based on a determination of whether a "lowpass filtered delta speed does exceed the limit" or, in other words, if a tire is sensed as operating at a different rotational speed relative to a preset value then the

presence of a spare tire is assumed. Thus, there is no disclosure or suggestion about "a3) a tire diameter difference computing unit for computing diameter difference of a tire" in Rodrigues.

Thus, Applicants respectfully submit that Rodrigues shows only switching control logics to determine the presence or not of a smaller (spare) tire based on tire rotational speed relative to a calibrated threshold speed value; and not a tire diameter difference computing unit for computing diameter difference of a tire. Moreover, Rodrigues further fails to disclose or suggest a final clutch torque computing unit for computing a final clutch torque, wherein the final clutch torque computing unit computes a final clutch torque by a computation involving the first and the second clutch torques in association with a ratio coefficient value which ration coefficient value changes according to the diameter difference of the tire so as to suppress a wheel slippage.

Ozaki et al.

Ozaki discloses, in the synthesizing unit 105, the feedback command value for the assist clutch transmission torque supplied from the assist clutch transmission torque FB command setting unit 104 is added to the assist clutch transmission torque FF command value supplied from the assist clutch transmission torque FF command setting unit 102. An assist clutch command value for controlling the assist clutch 25 is generated thus, and supplied to assist clutch drive device 28 (paragraph [0064]).

Thus, Ozaki simply adds the assist clutch transmission torque "FB" and the assist clutch transmission torque "FF" and obtains the final assist clutch torque to be supplied to the assist clutch 25. It is clearly understood that Ozaki fails to teach or suggest changing the ratio of the FF and FB variably according to an external parameter such as a diameter difference of a tire. Accordingly, since Ozaki has no disclosure or suggestion about the spare tire presence, it fails to remedy the above noted deficiencies in Rodrigues.

Applicants' Invention

Applicants claimed invention features the final clutch torque is set variably between the first clutch torque (e.g., the feedback-based clutch torque) and second clutch torque (e.g., the feed-forward-based clutch torque) in accordance with the ratio coefficient value which ration coefficient value changes according the diameter difference of the tire. The benefits of this inventive arrangement is set out on, for example, page 50, line 15 – page 51, line13 of the present application.

Claim 1 currently includes the feature of utilizing the ratio coefficient value which ration coefficient value changes according the diameter difference of the tire as seen from the last paragraph of claim 1. As noted above, the advantageous combination of features in claim 1 is not disclosed or suggested in the prior art.

Moreover, the applied references fail to disclose or suggest an arrangement wherein the ratio of the second clutch torque (e.g., the feed-forward-based clutch torque) is decreased as the tire diameter difference becomes larger. See present claims 3, 31 and 32.

Comparing feature a3) of the claimed invention and the spare tire means sensing in Rodrigues, it is clearly understood that Rodrigues only shows how to determine whether a spare tire is present and lacks a teaching or suggesting as to how to compute diameter differences of a tire.

Comparing feature a7) of the claimed invention and the switching control logics of the clutch according to the presence of a small tire in Rodrigues, it is clearly understood that Rodrigues uses only the presence of the small tire (or spare tire) and lacks a teaching or suggesting as to how to utilize the diameter difference of the tire.

Comparing feature a7) of the claimed invention and the clutch controlling feature in Ozaki involving only adding the two clutch torques determined in the earlier processing, it is clearly understood that Ozaki lacks the feature of claim 1 of variably changing the ratio of clutch torque.

Applicants respectfully submit that there is lacking any form of a teaching or a suggestion in both of Rodrigues and Ozaki of the claim 1 features described above. Thus, Applicants respectfully submit that Rodrigues, as modified by Ozaki, fails to teach or suggest the features of independent claim 1 and is also deficient relative to the dependents of that independent claim.

Applicants respectfully submit that independent claim 1 and dependent claims are patentable and that the application as a whole stands in condition for allowance.

Also, if any fees are due in connection with the filing of this amendment, such as fees under 37 C.F.R. §§ 1.16 or 1.17, please charge the fees to Deposit Account 02-4300; Order No.032405R156.

Respectfully submitted,

SMITH, GAMBRELL & RUSSEL, LLP

Dennis C. Rodgers, Reg. No. 32,936
1850 M Street NW – Suite 800
Washington, DC 20036
Telephone : 202/263-4300
Facsimile : 202/263-4329

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